DISCUSSION

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The papers presented in this session illustrate the broad range of issues which come up within survey research and related areas of experimental design. I am glad to see this kind of interaction since far too often these areas are kept quite separate. As the field of statistics grows and it becomes more difficult for individuals to keep pace with what is happening in related areas, the need for interaction of this type will not diminish.

The paper by Proctor finds the optimum systematic or periodic increment size for a nearly continuous process. Although its problem is appropriately posed as one of systematic sampling, it has similarities to other design problems.

For example, it is very similar to the choice of sampling interval in time series where the underlying process is continuous but discrete measurements are desired (cf. Box and Jenkins, 1976, pp. 399-400, 361-362, 486-491). There are even similarities to many other design problems where the size of sample (or subsample) is often selected without regard to the implications of not collecting information from the entire unit. Also, this problem has two- and higher-dimensional generalizations which may be quite relevant for a number of problems. Further work could even include tackling the very same problem by means of a different approach and comparing the performance of the competing design schemes.

More generally, the problem has characteristics similar to a large class of design problems facing statisticians. The author nicely extracts a reasonable but solvable representation of the problem. He then solves the statistical distillation of the problem. Finally he examines the sensitivity of the solution. Although the author does a fine job of incorporating all the issues of general statistical interest into the paper, in practice it would be good to incorporate the real problems of implementation into the sensitivity analysis (such as measurement error in the field, the effect of changes in the specification of the underlying model, and anything else that might cause a significant change in the result).

Aggarwal and Singh present methods for constructing complete sets of mutually orthogonal F-rectangles, which could be easily used by practicianers for design layout.

Although the paper contains little practical advice for actual use (reasonably considering that to be outside the scope of their work), it concisely lays out principles for constructing complete sets of mutually orthogonal F-rectangles and provides the F-rectangles for the smaller cases. Being able to construct the complete sets could be very useful for some applications.

Hung presents several nice results on a couple of topics within the area of regression estimation with transformed auxiliary variables. I hope that these results and related new work could be applied to more real problems by someone and that next year there could be discussion of the reasonableness of the assumptions made here for some actual problems. This might very well initiate some other helpful mathematical results in the area.

Tsao and Wright present the results of an empirical study on the stabilities of difference estimators, contributing to an area still in need of more work. The empirical approach taken by the authors is an appropriate method of attack due to the difficulties in evaluating these types of estimates.

Perhaps further work could contain evaluations based on larger and more commonly encountered problems (if not already completed) as was done by Bayless and Rao (1969, 1970) for the simpler case of estimating totals for sampling on one occasion. On the application side of things, it would be nice to see some more discussion of the practical implementation of the results in this paper at some later meeting.

Also, although it appears that the authors' recommended method would be very good on average, it's not clear to me that for an individual user with a small data set like the coal example, that the probability selection for the second date would be in their best interest (for that single problem).

Finally, it would be interesting to see results for other choices of population size and sample size to complement this welcome addition to the literature on difference estimators.

Al-Ghurabi presents some results on regression. Although I don't disagree with any calculations in particular, I would recommend that a revised version of the paper be submitted which clearly states the objectives of the paper.

I wish to thank all of the authors for their time and effort put into presenting the results of their recent work. I hope that there will be more opportunities for people working in survey sampling and other areas of statistical design to share their results and experience.

REFERENCES

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